Arlington Valley Energy Facility

Minor Permit Revision
Evaporative Water Spray System
Permit Number V99-014
Project Number 203705157

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Sign-off Sheet

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1.0 INTRODUCTION

Arlington Valley, LLC operates a 580 megawatt (MW) combined cycle power plant at the Arlington Valley Energy Facility (AVEF) in Arlington, Arizona in accordance with Title V Air Quality Operating Permit #V99-014, issued by the Maricopa County Air Quality Department (MCAQD) on November 20, 2000. In accordance with Maricopa County Air Pollution Control Rules and Regulations (Rules), Rule 210 §405, AVEF is submitting this minor permit revision application to add an evaporative spray system to the evaporation pond. The following sections of this document provide all of the information required by Rule 210, §405.3 for minor permit revisions at Title V sources.

2.0 PROPOSED MODIFICATION

AVEF proposes to install an evaporative water spray system ("Turbo-Mister") in the evaporative pond at the facility. The evaporation pond is used to process facility wastewater from the cooling tower blowdown, water treatment system, and other sources. AVEF has an Arizona Department of Environmental Quality (ADEQ) Aquifer Protection Permit (APP), which requires maintenance of a minimum freeboard in the evaporation pond at the facility to ensure that it does not overflow.

The Turbo-Mister operates by spraying water from the evaporation pond into the space above the pond to enhance the existing natural evaporation. Increased evaporation will reduce the pond's water level and allow maintenance of the minimum freeboard required.

The addition of the new equipment is proposed for May 2016. A Standard Permit Application Form is provided in Appendix A. Figure B.1 in Appendix B shows the proposed location of the Turbo-Mister.

2.1 EQUIPMENT INFORMATION

The new Turbo-Mister has a discharge capacity of 80.1 gallons per minute and has a maximum potential operation schedule of 24 hours per day, 365 days per year. Specification information from the equipment manufacturer is provided in Appendix C.

3.0 EMISSIONS INVENTORY

The proposed modification will affect emissions of particulate matter (PM), particulate matter equal to or less than 10 microns in aerodynamic diameter (PM_{10}), and particulate matter equal to or less than 2.5 microns in aerodynamic diameter ($PM_{2.5}$).

3.1 POTENTIAL TO EMIT OF NEW EQUIPMENT

The addition of the Turbo-Mister to the evaporation pond will lead to an increase in the potential to emit of PM, PM_{10}, and $PM_{2.5}$. The potential to emit (PTE) of the Turbo-Mister was calculated using continuous / maximum operation (8,760 hours per year), the maximum water flow rate of the equipment (80.1 gallons per minute (gpm)), and a maximum evaporation pond total dissolved solids (TDS) content of 120,000 parts per million (ppm). Emission factors from the Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, Fifth Edition (AP-42), United States Environmental Protection Agency (USEPA) for forced-draft cooling towers were used to estimate emissions from the Turbo-Mister.

The methodology used to calculate the potential emissions of the new equipment are presented in Appendix D. Detailed calculations of the new potential emissions are presented in Appendix E.

The increase in PM, PM_{10}, and $PM_{2.5}$ emissions due to the addition of the Turbo-Mister is summarized in Table 1, below. The net increases in potential emissions of PM and PM_{10} are below the significant emission rates defined in Rule 100.

Table 1 PTE of Turbo-Mister

Regulated Air Pollutant	PTE (tpy)
PM	4.29
PM_{10}	4.29
$PM_{2.5}$	4.29

APPENDICES

Appendix A STANDARD PERMIT APPLICATION FORM

Appendix B FIGURES

Appendix C MANUFACTURER'S SPECIFICATIONS

Appendix D INVENTORY METHODOLOGY

D.1 INTRODUCTION

Section D.2 of this appendix describes the methodology used to calculate PM, PM_{10}, and $PM_{2.5}$ emissions for the Turbo-Mister.

D.2 PARTICULATE MATTER EMISSIONS – TURBO-MISTER

D.2.1 Process Rates

The annual and hourly process rates for the Turbo-Mister are based on the maximum water flow rate (80.1 gpm) and continuous operation (60 minutes/hour and 8,760 hours/year).

D.2.2 Emission Factors

Because there are no published emission factors for evaporative spray systems, the PM, PM_{10}, and $PM_{2.5}$ emissions from the operation of the Turbo-Mister were estimated using the drift rate information for induced draft cooling towers from AP-42, Section 13.4 (01/95), Table 13.4-1, and an assumed maximum TDS fraction of the water in the evaporation pond of 60,000 ppm.

$$EF = TLD \times TDS$$

where:

EF	=	emission factor (lb/1,000 gallons)
TLD	=	total liquid drift, 1.7 $lb/10^3$ gal, from Table 13.4-1
TDS	=	total dissolved solids concentration in the drift. Maximum concentration in the evaporation pond is assumed to be 120,000 ppm

As stated in AP-42, Section 13.4, a conservatively high PM_{10} emission factor can be obtained by (a) multiplying the total liquid drift factor by the total dissolved solids (TDS) fraction in the water and (b) assuming that, once the water evaporates, all remaining solid particles are within the PM_{10} size range. PM and $PM_{2.5}$ emissions are assumed to be equivalent to PM_{10}.

D.2.3 Capture/Control Efficiencies

Besides good operating practices, other pollution control methods are not implemented on the Turbo-Mister.

Appendix E EMISSION INVENTORY